

New Initiatives in Soil Interpretation

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A Healthy Soil: The Key For A Healthy Environment

Soil Interpretations Staff

- **Maxine Levin – National Leader**
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- **Bob Dobos – Lead Soil Interpretations Specialist**
- **Steve Peaslee – GIS Specialist**
- **Linda Scheffe – Agronomist**
- **Cathy Seybold – Interpretations/calculations/pedotransfer functions/validation**
- **Sue Southard – Natural Resource Interpretations**

Interpretation

- An interpretation is based on soil and site properties predicting how a soil will respond to land use
- “Land use” can take on a variety of meanings, for example:
 - Production agriculture
 - Habitat for a tortoise
 - Habitat for a soil-borne pathogen
 - Sink for organic carbon
 - Sink for radioactive material
 - Homesite development

Interpretation

- The best interpretations are provided through an interagency, interdisciplinary effort
- Product can be an integrated user-friendly tool to support a common need
- Provide excellent customer service in meeting both internal and external customer needs. Interpretations addresses practice-specific needs; new user needs, such as wildlife habitat suitability; disaster response; climate and land use, nutrient leaching and runoff risk, and storm water management; and other agricultural and non-agricultural interpretations.
- Provide integrated tools and resources to better facilitate development of sustainable farming systems and sustainable communities.
-

Recent Products and Interpretations

- **K,T,I,WEG, HSG, Corrosivity** – Calculations for consistent, science-based soil profile interpretations
- **Subaqueous Soil Interpretations** – Initial interpretations designs/criteria for under water soils
- **Groundwater banking in California** -- Put excess precipitation from the strong El Nino into aquifers
- **Gopher tortoise habitat suitability** – Locate best soils to fund for preservation efforts for a threatened species
- **Estimate Linear Extensibility** – An important but not always measured soil property
- **Soil Fragility Index** as a metric for resistance and resilience

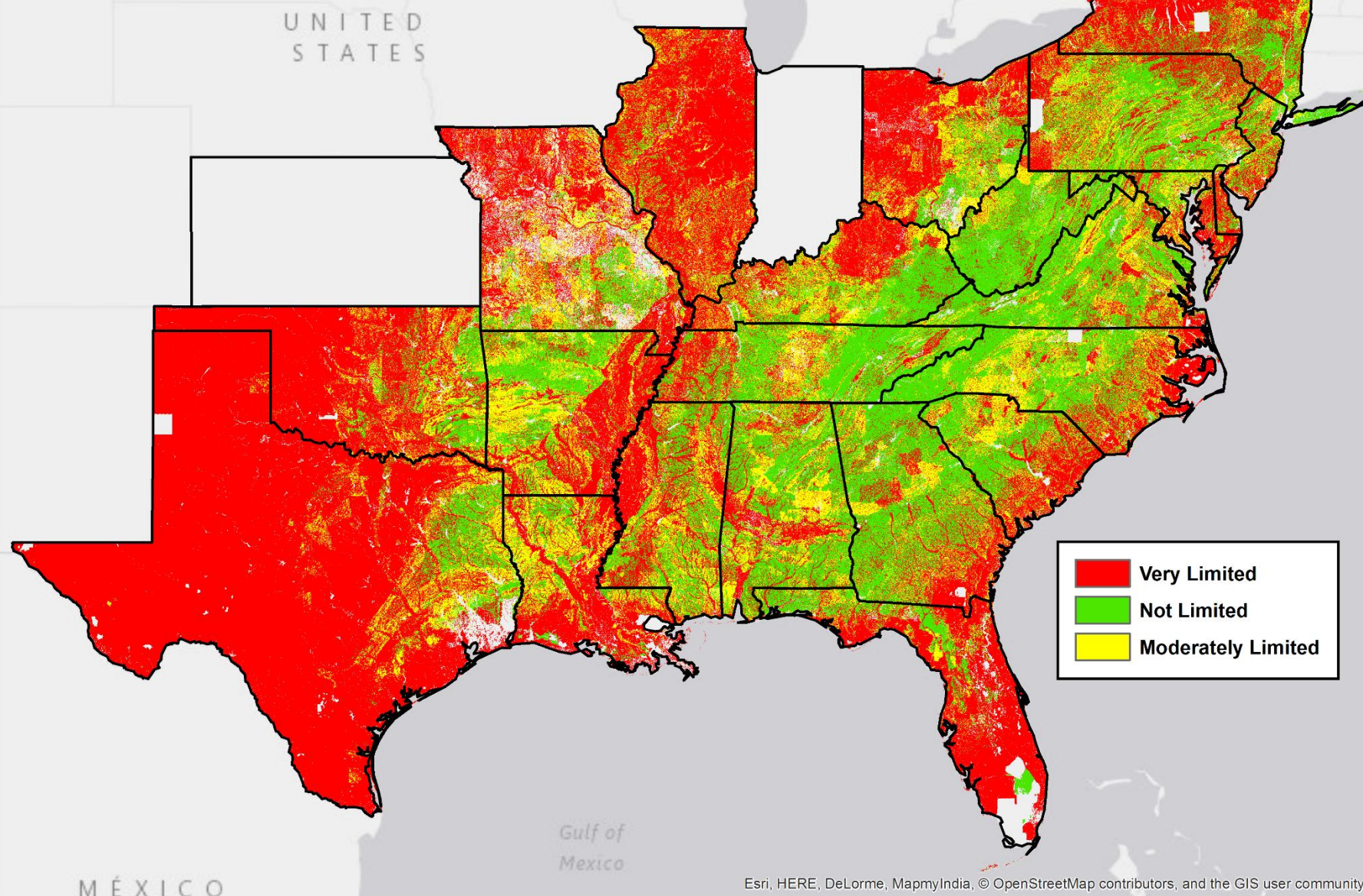
Recent Products and Interpretations

- **National Parks soil surveys and interpretive material**
- **Soybeans submodel for NCCPI is available for testing.**
- **Irrigated NCCPI is available for vetting.**
- **Limitations for ground-mounted solar panel arrays**
- **Soil suitability for geothermal heat pumps**
- **Soil suitability for clandestine graves**
- **Climate change impacts on crop productivity – Which crops will be grown where and how well will they do?**
- **RUSLE2 release with SSURGO soils import functionality – soil erosion and soil quality; used by NRCS conservation planners and technical service providers**

Soil Interpretation for Shortleaf Pine

- Shortleaf pine (*Pinus echinata*) affected by littleleaf disease; most serious disease of shortleaf pine in the Southern US. Affected trees have reduced growth rates and usually die within 2-6 years.
- Disease is caused by a complex of factors that stress the tree, including severe soil erosion, the fungus *Phytophthora cinnamomi* Rands, low soil nitrogen, and poor soil drainage.
- University of Georgia has been building a shortleaf pine online support tool to provide private landowners and forest managers comprehensive silvicultural information for the management and restoration of shortleaf pine across its 22-state range.
- This tool/website, includes GIS/ map based web application for locating sites suitable to grow shortleaf pine. This GIS-based site suitability application, in large part, is based on soil characteristics evaluated from NCSS SSURGO data with assistance from NRCS staff.
- The specific soil characteristics that limit shortleaf pine due to littleleaf disease include saturated hydraulic conductivity, past erosion, wetness, flooding, soil depth, shrink-swell, and pH.

Shortleaf Pine Site Limitation



[http://shortleafpine.net/tools-and-resources/site-suitability-and-decision-](http://shortleafpine.net/tools-and-resources/site-suitability-and-decision-support-tool)
[support-tool](http://shortleafpine.net/tools-and-resources/site-suitability-and-decision-support-tool)

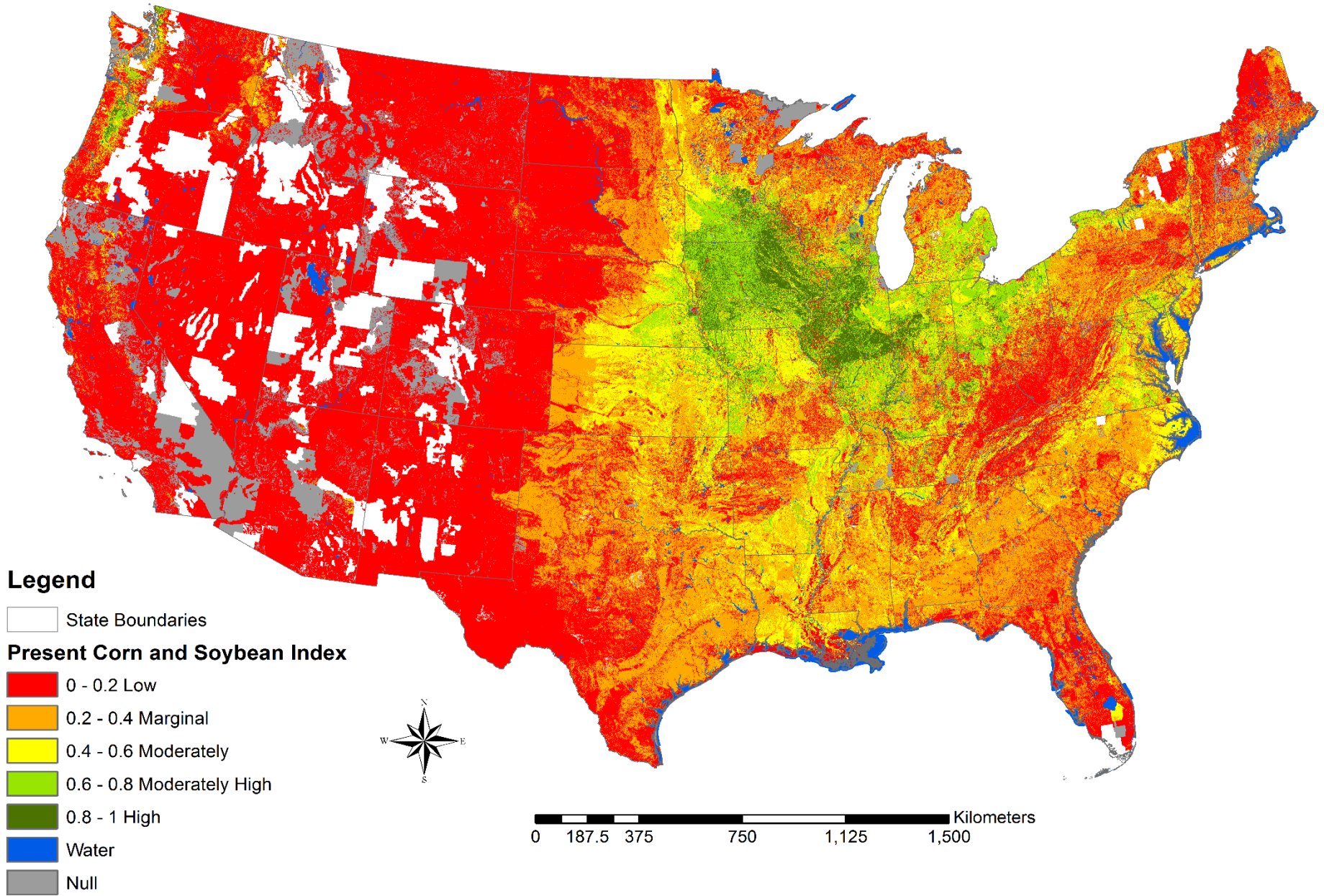
The screenshot displays the web interface of the Shortleaf Pine Initiative Site Suitability & Decision Support Tool. The browser address bar shows the URL: <http://shortleafpine.net/tools-and-resources/site-suitability-and-decision-support-tool>. The page features a navigation bar with links for Home, Why Shortleaf, and Growing Shortleaves. The main header includes the Shortleaf Pine INITIATIVE logo and the title "Site Suitability & Decision Support Tool".

On the left side, there is a sidebar with the following sections:

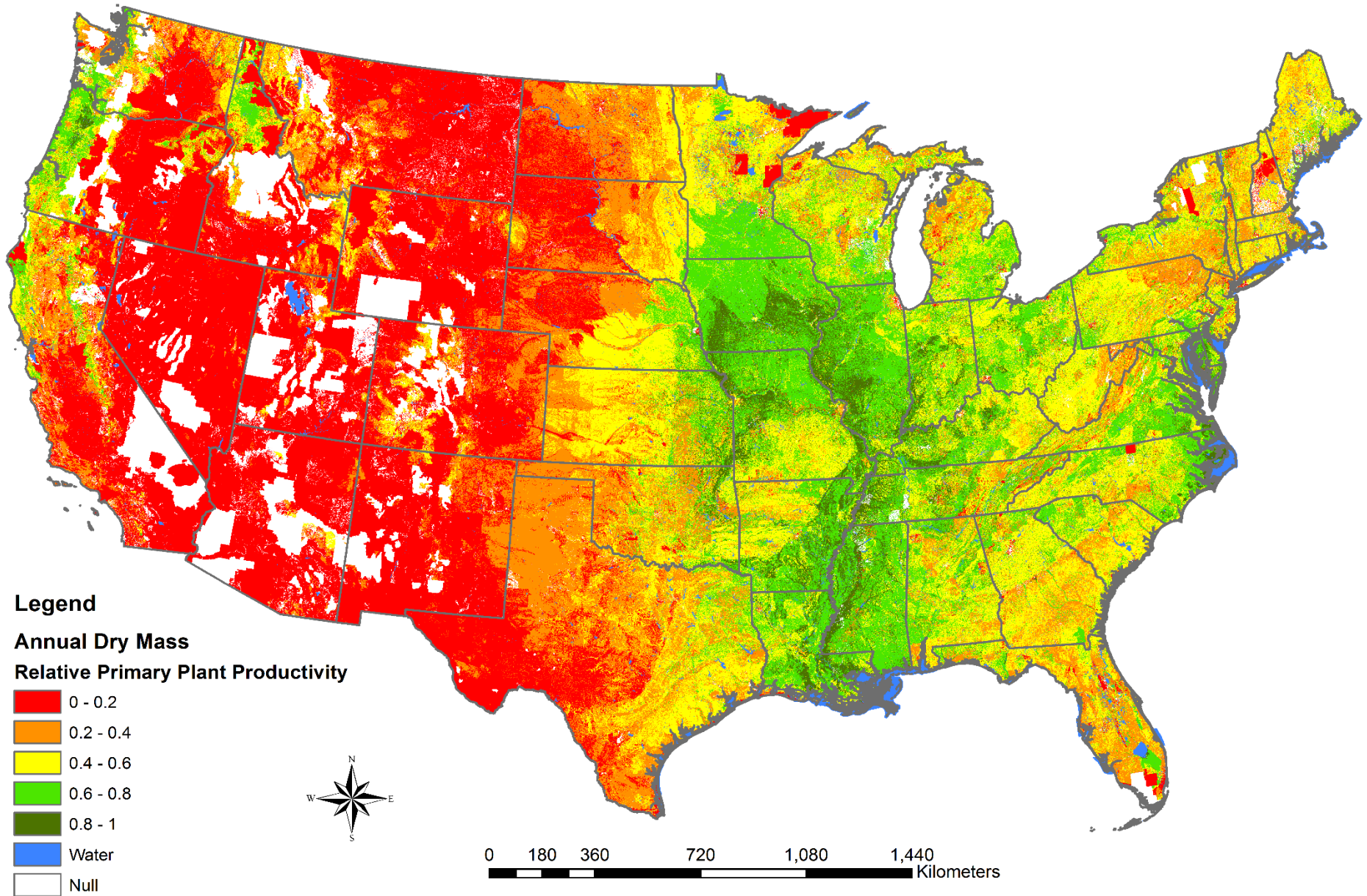
- State:** A dropdown menu.
- County:** A dropdown menu.
- Search:** A text input field.
- DATA LAYERS:**
 - Reference & Range Maps:**
 - ☐ Counties
 - ☐ States
 - ☐ Shortleaf Pine Nurseries
 - ☐ Little's Historic Shortleaf Pine Range
 - Forest Health:**
 - ☐ Historic Littleleaf Counties
 - Shortleaf Pine Occurrence:**
 - ☐ Shortleaf Pine Basal Area Proportion
 - ☐ Shortleaf Pine Seedlings
 - ☐ Shortleaf Pine Stems > 1 in. DBH
 - ☐ Shortleaf Pine Plot Forest Types
 - Site Characteristics:**
 - ☐ Shortleaf Pine Site Indices
 - ☐ Shortleaf Pine Soil Limitation
- LEGEND:** A section at the bottom of the sidebar.

The main content area displays a map of the United States, showing state boundaries and major cities. The map is titled "UNITED STATES" and "GREAT PLAINS". The map includes a scale bar and a north arrow. The map is currently showing the Great Plains region, including states like Wyoming, Colorado, Nebraska, Kansas, Oklahoma, Texas, and New Mexico. The map also shows major cities like Denver, Salt Lake City, Minneapolis, St. Louis, Chicago, Kansas City, Dallas, Houston, San Antonio, Austin, El Paso, Phoenix, Tucson, and Albuquerque. The map is currently showing the Great Plains region, including states like Wyoming, Colorado, Nebraska, Kansas, Oklahoma, Texas, and New Mexico. The map also shows major cities like Denver, Salt Lake City, Minneapolis, St. Louis, Chicago, Kansas City, Dallas, Houston, San Antonio, Austin, El Paso, Phoenix, Tucson, and Albuquerque.

Corn and Soybean Trends



CONUS Relative Primary Productivity



Future

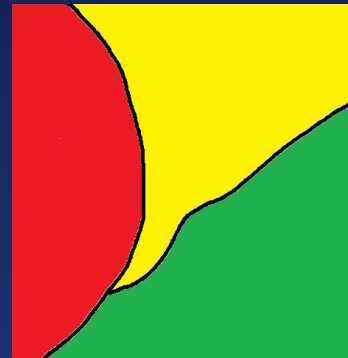
- Methyl Mercury production
- Agronomic States
- Potential for Sinkholes
- Specialty Crops Suitability (e.g. Hops)
- Forested Biomass Harvesting
- Potential Ginseng Production
- Geothermal Installation
- Highly Pathogenic Avian Influenza (HPAI)
- Regionally enhanced NCCPI? (Caribbean Crop Productivity Index)
- Wind Turbine

Future

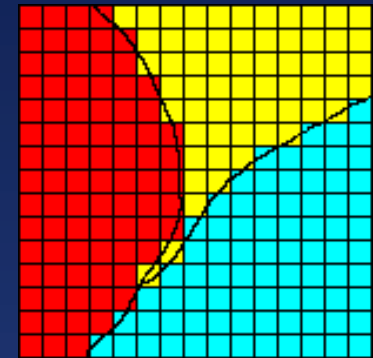
- Salinity Risk Index
- Oyster Interpretations
- Pollinator Habitat/Plant suitability interpretations
- Plant variety interpretations
- Update Cropland Suitability for Drainage Water Management
- “Coprodukt” from Hydro-fracturing
- Storm Surge Flooding Interpretations(Coastal Initiative)
- Cheat Mountain Salamander Habitat
- Soil-borne diseases suite of interpretations(APHIS, CDC)

Future

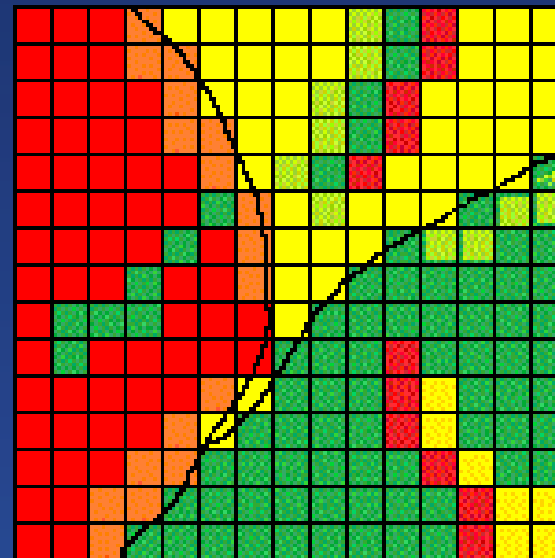
- Spatially explicit interpretative output
- Data from best sources



SSURGO

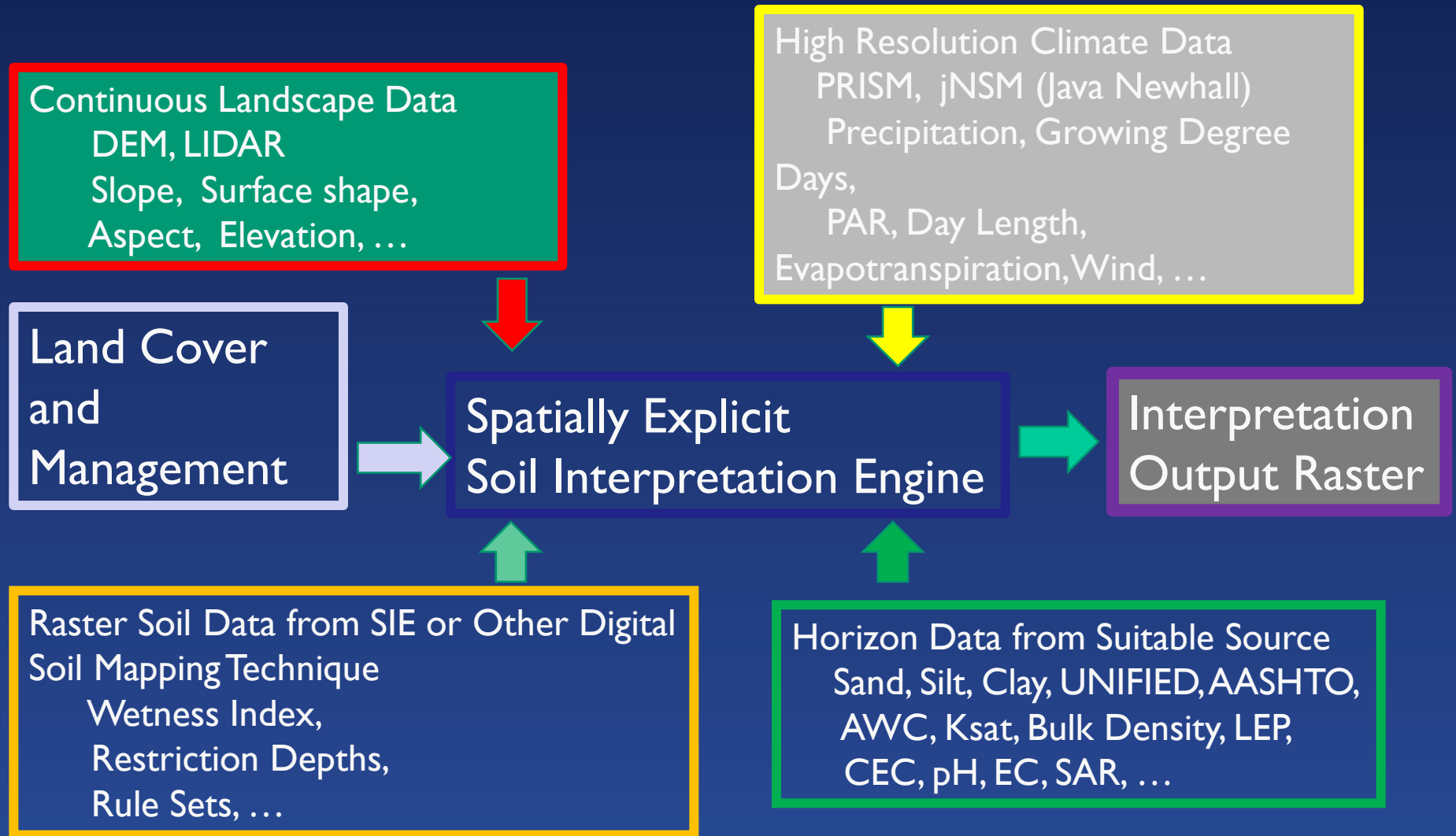


gSSURGO



Raster

What if?



Soil Health Rapid Assessment Tool

- A tool to guide soil health assessment
- Interactively guides the user through assessments that are:
 - Rapid
 - Relatively easy
 - Field based
- Should be tablet or mobile device based
- Need to finish interpretations; seeking funding for app

SH - RAT

- User Enters Site, Soil, and User Information
- User Records Resource Concerns
- Tool Assists User to Select Appropriate SH indicators and methods
- User Enters Results from SH indicator methods
- Tool Scores Results and Provides Metrics of SH
- Tool Assists User in Providing Recommendations for Improving SH

Soil Health Rapid Assessment Tool

Soil Health – Rapid Assessment Tool Database

1 & 2 & 3: Enter Info

Database selects methods

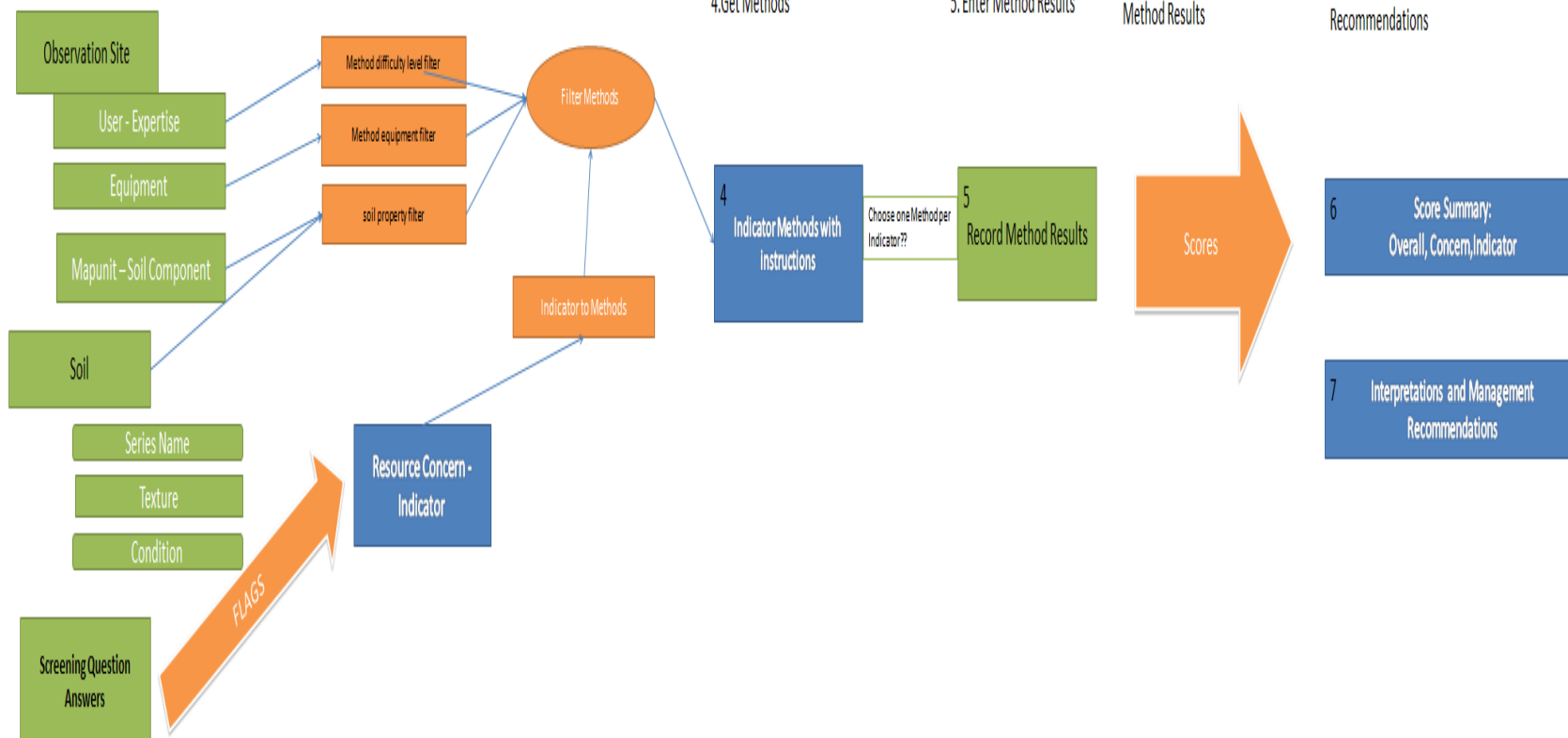
4. Get Methods

5. Enter Method Results

Scoring Function Applied to
Method Results

6 & 7 Summary and
Recommendations









Green – user input
Orange – internal db work
Blue – output









Integrated Tools and Approaches for Sustainable Farming Systems

-  Conservation planners, soil scientists and interdisciplinary teams work with producers to inventory soil, water, air, plant, and animal resources on the land and develop conservation plans and sustainable farming systems
- Objectives include:
 -  Reduce overall on-farm energy use, inputs, production costs, pest incidences, water loss, soil loss; improve production, air, water, and soil quality
 -  More economical, sustainable farming enterprise
 -  Healthier watershed and community








Integrated Tools and Approaches for Sustainable Farming Systems

-  Use integrated systems approach (ecosystem, whole farm, watershed)
-  Use problem-posing, problem-solving approach
-  Actively seek resource, watershed, marketing opportunities
-  Provide resource efficient and resource conserving alternatives
-  Utilize technology “exchange” vs. “transfer”
-  Develop whole farm conservation plan; plan creatively and flexibly
-  Consider on-site and off-site effects
-  Focus on keeping energy flow through the integrated system

Integrated Tools and Approaches for Sustainable Farming Systems

-  Reemphasize biological factors, improve biodiversity
-  Improving soil health is key to improving soil, water, air, plant, animal resources
-  Develop case studies, field trials, on-farm research/demonstrations, farmer-to- farmer networks
-  Form interdisciplinary teams, including producers and partners; hold integrated soil management/conservation planning workshops
-  Develop user friendly fact sheets, tech notes on integrated systems and tools
-  NRCS and NCSS have model approach and advise on developing soil survey/soil science and conservation/watershed planning infrastructure internationally

Integrated Tools and Approaches for Sustainable Farming Systems

-  Reemphasize importance of whole farm and watershed planning with NCSS partnership in lead
-  Reemphasize importance of keen observation skills; develop observational planning tool; promote folks getting to field
-  Share financial and human resources for development of new interpretations, technology and user friendly tools
-  Reemphasize the importance of people; do not promote automated tools which decrease the creative ability and critical thinking of people.
-  Provide living soil demos; integrate soil systems approach with conservation planning process;
-  Communicate - Share other ideas, needs, opportunities as we work together
-  Develop regional NCSS plan

Thanks for your partnership and collaboration

